

MAY/JUNE '85

VOL.1 NO.4

FOR THE T/S 2068 AND ALL OTHER
TIMEX AND SINCLAIR COMPUTERS

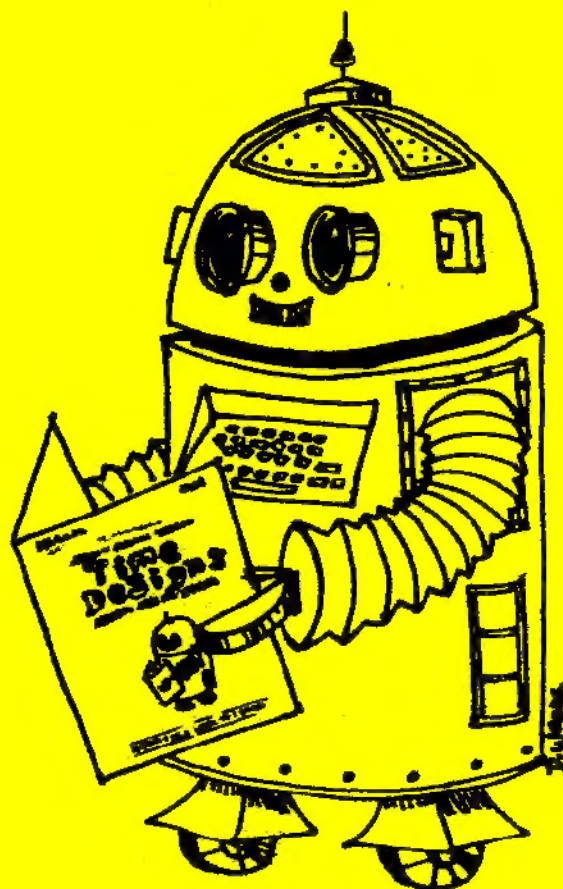
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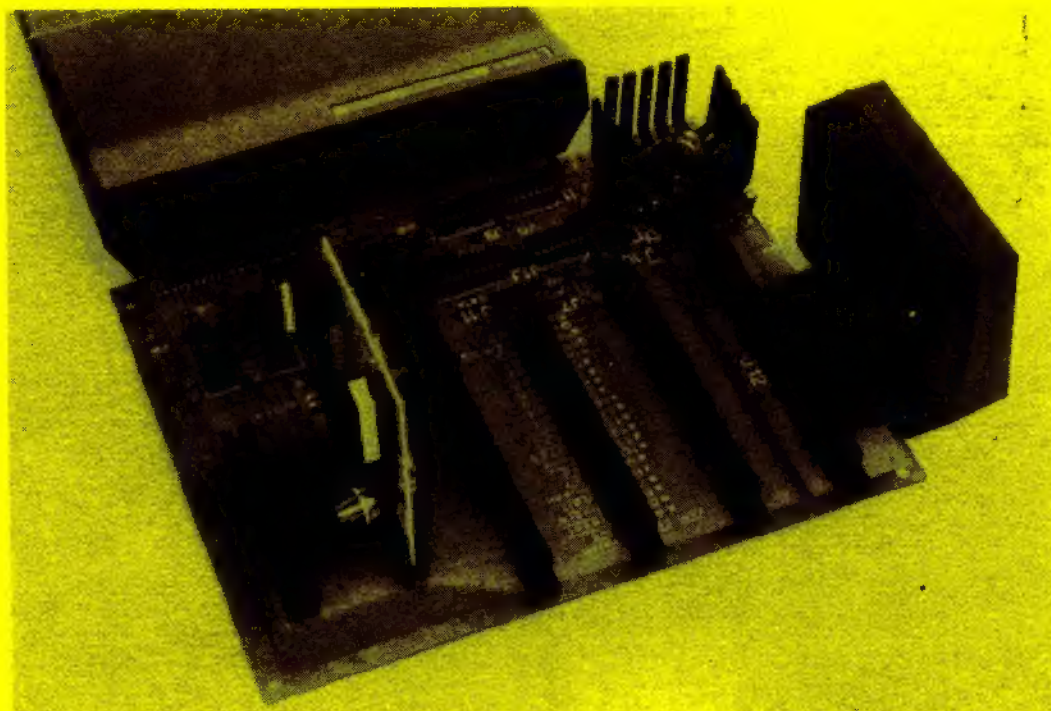
MAGAZINE



2068
is
COMING BACK!
DETAILS
INSIDE

INTRODUCTION TO COMPUTER CONTROL

BUDGET ROBOTICS & COMPUTING, BOX 18616, TUCSON, ARIZONA 85731



Above shows fully populated BUFFERED BUSS EXPANSION BOARD and RX-81 PARALLEL I/O BOARD plugged into TS1000 with 16K RAM. 5 volt 3 amp regulator (top right), buffer/decoder ICs (across top), six expansion connector points (across bottom) with RX-81 I/O board plugged into expansion point second from left.

BUFFERED BUSS EXPANSION BOARD - 6 3/8" x 8 1/4" double sided/
Plated thru holes/Parts list/documentation/90 degree connector.
For ZX80, ZX81, TS1000 & TS1500. Versions available:

'EXP-1' Bare board version	\$40
'EXP-1A' Fully populated kit	\$80
'EXP-1B' Economy kit	\$62
(add EXP-1R and EXP-1C later for a fully populated board)	
'EXP-1R' 5 volt/3 amp regulator kit (use with EXP-1B or EXP-1)	\$7
'EXP-1C' Extra connectors (use with EXP-1B or EXP-1)	\$11

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'RX-81B' Fully populated kit, minus connector	\$21
(Plugs into BUFFERED BUSS EXPANSION BOARD)	
'RX-81C' Demo/test kit	\$4
(LED array and DIP switch for output and input demo/test)	

Order by alpha-numeric abbreviation (i.e. 'EXP-1B'). Postage &
handling to U.S. and Canada included. Overseas add 10%. Send
check or money order (U.S. dollars) allow check clearance time.

BUDGET ROBOTICS & COMPUTING, BOX 18616, TUCSON, AZ 85731

FOR THE T/S 2068 AND ALL OTHER
TIMEX AND SIMCLAIR COMPUTERS

Time DesignsTM

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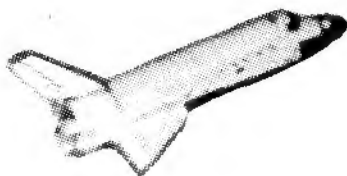
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on the cover:

The intelligent computer-controlled droid on this issue's cover was designed and drawn by Debbie Woods, an artist from San Jose, California.



Editor's Corner

I recently returned from a trip to California. Sinclair computing is alive and well in that large west coast state, and I was able to visit with some interesting T/S enthusiasts (in-person and a few on the phone). Jerry Chamkif, president of Aerco in Austin, Texas was also in California on business (and vacation) at the same time as I was, but unfortunately our paths never crossed. Jerry demonstrated his new 2068 Disc System at the San Francisco Users Group meeting. There were some problems with the disk software and the system crashed a few times. This has been corrected with some help from Jack Dohany of Menlo Park, CA. Aerco started shipping Disc Systems and Interfaces on April 12.

My first stop was Sunset Electronics down by the waterfront in San Francisco, to meet with owner and proprietor John Warburton. This is one of the few actual stores in the U.S. that deal in Timex Computer Equipment and Accessories. I even found Time Designs Magazine on the book rack there. Sunset Electronics also does a large mail order business (32 page catalog available upon request. Write to: 2254 Taraval St., San Francisco, CA, 94116). John and some other T/S users in the Bay Area were preparing for the annual West Coast Computer Faire on March 30-April 2. Arrangements had been made with Sinclair to show a QL there.

Down the Peninsula a few miles, in the Silicon Valley I found the manufacturing and operating facility of A & J Micro Drive. Jim Howell is the "man-in-charge" here, and they have recently introduced a stringy-floppy system for the stock T/S 2068. Along with Jim, there are 10 other employees who assemble and test the drives and wafers. A & J's biggest business is drives and interfaces for various models of electronic

typewriters on the market. While I was there, Jim told me that he had purchased the rights and equipment of the wafer technology used in the T/S 1000 Micro Drive from Entrepo (the inventors). A & J will now incorporate the model 1000 style wafers (version 0) and drives into the model 2000 for the T/S 2068. The original model 2000 used a different wafer (version 2) and are not compatible with the new units being shipped. On the outside the model 2000 Micro Drive will remain the same.

Before heading south, I chatted on the phone with Bob Orrfelt of Redwood City, CA and also Rita Carr, who is the chairperson of the Silicon Valley T/S Users Group. Bob Orrfelt has his own cottage industry and offers a 64 Col. Word Processor for the 2068, and some nifty new EPROM Cartridge Boards. Among some other things he has been working on is fixing up the "bugs" in the 2068's ROM. Bob may be contributing some information for Time Designs readers in an upcoming issue.

Down in Los Angeles, home of congested freeways, smog and Mickey Mouse...I met with Sinclair computer expert Dave Clifford. Dave wrote a review in our last issue on the Z-Link interface card. He is also very knowledgeable on telecommunications using the Westridge 2050 Modem and MTERM II Software. Dave demonstrated his Sinclair Microdrives on the 2068 for me. They are very compact little units, but also very fast!

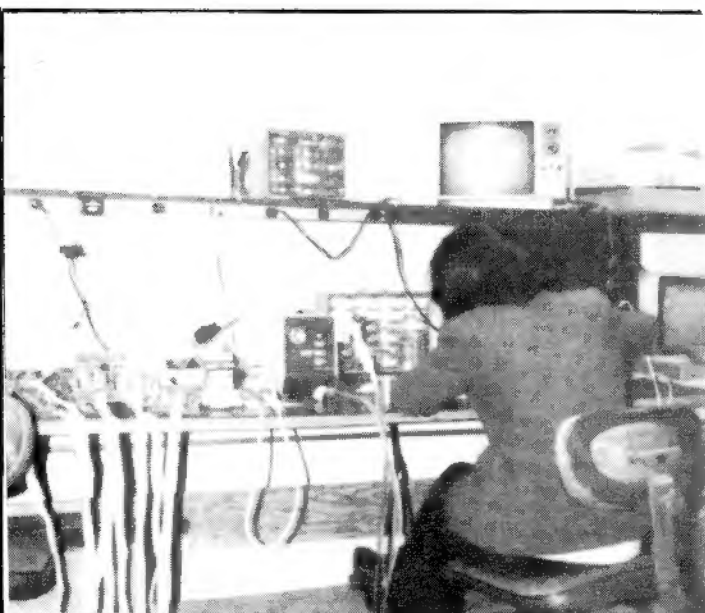
Well here we are back "home". And before closing, I want to say thank you to all of you who have mentioned or shown your copy of Time Designs to other T/S users. It is appreciated and benefits us all. Not only does it increase our circulation, but it will also enable us to add more pages and articles to the magazine for you.

See you next issue!

Tim Woods/Editor



Jim Howell in his office at A & J Microdrive in Sunnyvale, California.



An unidentified employee assembles Model 2000 Microdrive units for the Timex 2068. Circuit boards and ribbon cables are shown on the left.



letters to the editor

Send your correspondence to: Time Designs Magazine, C/O The Editor, 29722 Hult Rd., Colton, OR 97017.

about 100 pages per issue, and covers the whole field of electronics for hobbyists and experimenters, with considerable computer coverage. They have scheduled the QL as the cover story of the June issue, which comes out in May, pending FCC approval of the U.S. QL (which is expected any day.....)

Sincerely,
Fred Blechman
Canoga Park, CA

(EDITOR- Thank you very much Fred for the nice compliments about TIME DESIGNS. We keep trying. Our readers, I am sure were interested in hearing what you were up to lately. Many of them have your Howard W. Sams book on the T/S 2068. Also, I would like to mention to our readers that you have agreed to contribute some info on the QL in a future issue of TIME DESIGNS.)

Gentlemen,

Thanks for your copy of VOL 1, NO 3. Very well Executed! Being a ZX81 owner, I do hope you will not forget us.

Sincerely,
L. Chavarie
Ottawa, Ontario
Canada

(EDITOR- We certainly won't forget you. ZX81 users have received a lot of criticism in the past, but Bruce C. Taylor's article on computer control in this issue, affirms what a very powerful little computer it is. We will give you more programs and articles in the future.)

Dear Tim,

Yesterday, as one of the guest speakers at the bi-monthly meeting of the West Los Angeles ZX81 Users Group, I received a complimentary copy of the March/April '85 issue of Time Designs through the co-operation of Ed Gray.

What a nice job you're doing! I found your magazine contained lots of useful material, was clearly printed, and reasonably free of typos. The reproduction of LISTings, photos and graphics was particularly good compared to most other Timex/Sinclair publications (mostly newsletters).

My personal involvement in the Sinclair/Timex world has been minimal since I completed my Howard W. Sams book on the 2068 almost two years ago ("TIMEX SINCLAIR 2068 BEGINNER/INTERMEDIATE GUIDE"). I've since written three other books- the "awful" ADAM, the "spectacular" Sanyo MBC 550 Series, and the "rotten" Apple //c. (Those quotes represent my one-word reaction to the computer.

However, your readers might be interested that last December I got the loan of an English Sinclair QL for a month, and did an over-7000 word detailed review for MODERN ELECTRONICS (76 North Broadway, Hicksville, NY 11801, \$12.97 for 12 monthly issues). This slick new magazine (8 issues so far) is

BITS AND PIECES

SINCLAIR NEWS

Sinclair of the U.K. has just recently returned from a couple of electronics industry trade shows in the Soviet Union. The Kremlin is trying to upgrade their culture and education system with microcomputers similar to what one might see in a typical American elementary school classroom. The iron curtain hi-tech industry is years behind other parts of the world as far as mass production. Existing microcomputers in the Soviet Union consist of poor copies of the Apple II. Sinclair demonstrated their Spectrum Plus and QL to the eager Soviets. I wonder what they thought of "one stroke keyword commands?"

Sinclair has ceased production of the original ZX Spectrum (16k and 48k versions), and is marketing exclusively the Spectrum Plus. This computer is styled after their top-of-the-line QL. Has an improved keyboard and 48k RAM.

Speaking of the QL, Mary Reinman of Sinclair (U.S.) could not give us word of it's release as we went to press. The comment was made that FCC approval was just "a couple of weeks" away. Some experts here and abroad, claim that FCC has already approved the computer, and that Sinclair is waiting for units to ship before they announce availability.

One U.S. vendor that is patiently waiting for the release of the QL, is Curry Computer (5344 W. Banff, Glendale, AZ 85306). They have stocked a large quantity of QL software and books. They also publish a newsletter called "The QL Report". In the April '85 issue that we received, there was a sample of a QL screen display from a program called "GRAPHIQL". Very impressive.

The English computer press has not always been very kind towards the QL, and on more than one occasion remarked about it's rather "slow" operating system. However, the few individuals here in the U.S. that are fortunate to own the British QL, are very pleased with the computer and speak very favorably of it. We have yet to see what changes Sinclair made on the machine to bring it to America.

TELECOMMUNICATIONS

The Weymil Corp. (Box 5904, Bellingham, WA 98227-5904) has a software package called MINI XMOD 1.5 for the ZX81/TS 1000/1500 and the Westridge and Byte Back modems. It has the ability to access the CPM files section of any XMODEM protocol BBS to up or download Timex programs. Features include memory storage of screen displays and an indicator that reports when memory is full. Documentation and step by step instructions is included. There are both 16/64k versions. The 64k version stores easily in the Hunter Board for instant recall. Price is \$20.

USERS GROUP UPDATE

Add these Timex/Sinclair Users Groups to your list. The March/April '85 issue of Time Designs carried a large directory of Groups in the U.S. and Canada. If you are a member of an active group that did not appear on this list, and would like to be mentioned, please send us the information.

Timex/Sinclair Users Group
Hughes Aircraft Company
Att: Liabrary (personal computer club)
8433 Fallbrook Ave.
Canoga Park, CA 91304
contact: Tony Gomez

N.W. Florida 2068 T/S User Group
402 Pine Terrace Circle
Milton, Florida 32570
contact: Edwin S. Salter

REPAIR CHANGES

TS Connection (3832 Watterson, Cincinnati, OH 45227) has taken over the Timex computer factory repair service previously offered by Timex in Little Rock, Arkansas. They will repair a TS 1000 for \$20 maximum, and a 2068 for \$40 max. The 2068 Tech Manual is also carried by TS Connection. If your computer is on the fritz, write to them at the address mentioned above, or call (513) 271-5575.

OLIGER/KINGSLEY DISC SYSTEM

In a joint venture between John Oliger and Ray Kingsley (of Sinware), a new inexpensive disc drive controller for the 2068 will be available sometime in mid June. The hardware for the disc operating system is being designed by John Oliger, while the software to boot up the controller is being programmed by Ray Kingsley. The main disc interface board is already completed. It will support up to four single or double sided, single, double or quad density 3 to 5 $\frac{1}{4}$ inch drives. The data transfer rate of this board (5 $\frac{1}{4}$ -double density) is 32k bytes per second...the actual rate will be determined by the software efficiency. Software support is only planned for the 2068, and possibly the Spectrum (in the future).

Further hardware for the controller include a firmware/bank logic/memory board and/or the 64k memory/CPM board. These two boards are furthest away from production, but should be coming along soon. It is hoped that the system will respond like the Sinclair Interface One with Microdrives, and use all the BASIC supported keywords (including SAVE and LOAD). Prices on the boards are still to be determined. It should also be pointed out that the controller is designed for use with the Oliger 2068 Expansion Board.

Specific comments/suggestions concerning hardware for the system should be addressed to: The John Oliger Co., 11601 Whidbey Dr., Cumberland, IN 46229. Comments, suggestions, ect. regarding software should be addressed to: Ray Kingsley, C/O Sinware Software, P.O. Box 8032, Santa Fe, NM 87504. If you would like to be put on the system's "inform when ready" list, drop John a post-card.

Mr. Oliger also announced availability of his new 2068 Parallel Printer Port. It is a Centronics type and comes complete with software on cassette. It is also Aerco compatible as far as commercial software is concerned. It is perhaps the lowest priced printer interface of it's kind, with the fully assembled and tested version (with cable) going for \$47.90. The kit with parts is \$24.95 (add \$16.95 for cable), and a bare board is available for \$16.95 and includes the cassette. A 15 page user manual is supplied with every version.

E. Arthur Brown has always put out a very professional and slick brochure. The most recent one continues the tradition. It probably has something to do with Eben Brown's (the owner) experience in the publishing business. The EB7 catalog is on newsprint paper and features a host of hardware and software for Timex computers. For your copy, write to: 3404 Pawnee Dr., Alexandria, MN 56308.

The printer interface cable and software for the A & J Model 2000 Micro Drive is now available. For information and price write to: A & J Micro Drive, Suite I, 1050 E. Duane Ave., Sunnyvale, CA 94086.

The address for the D. Lipinski Software Buyers Guide To Sinclair-Timex Products And Services, that we mentioned in the March/April '85 issue is: 2737 Susquehanna Rd., Roslyn, PA 19001. Price is \$20 ppd.

Kirt Olsen, Publisher/Editor of Syntax, told Time Designs that he intends to continue publishing the newsletter. He also mentioned that Syntax (and SQ Magazine) is up for sale. The last newsletter that Kirt put out was the November '84 issue. He told us that the December '84 issue of Syntax should be out in another month or so.

Time Designs Magazine would like to welcome all our Canadian readers "on-board" who have recently subscribed. The number of our friends up north grows each day. It just goes to show you that Canadians know a good computer when they see one. Happy Sinclair computing to you all!

ZX81/TS 1000 KEYBOARD



A large number of ZX81/TS 1000 users have "discovered" perhaps the best keyboard add-on that has ever been offered for the price. It is the computer keyboard that was used with the Texas Instruments 994/a. They are being sold at surplus electronic outlets and some Radio Shack stores for the extremely low price of \$2.95 to \$5.95 (depending where you obtain one). The challenge is the installation. We have seen some nice ideas. Hopefully, we will be able to print them in an upcoming issue. If you have a suggestion, send it in and we may print yours.

SPECIAL REPORT:

2068 IS RETURNING TO U.S.



When Bob Dyl of the English Micro Connection contacted Timex of Portugal to see if he could obtain supplies of their new floppy disk system and 2068 "silver avenger" computer (as so nick-named by the British computer press), both of which had been sold in England for several months, he learned of some very suprising news. Antonio Gomez, the Managing Director of Timex Portugal told Bob that they were in the process of bringing the 2068 and the disk system to the United States themselves. In fact samples of each were currently in the hands of the FCC for approval. At this writing a Mr. Olivera who is the assistant to Gomez, is in Waterbury, Conn. at the Timex Corp. headquarters (which Timex Portugal is using for their temporary base) to finish up last minute paperwork, including signing the FCC certification release papers.

This certainly is a strange situation. A Timex paradox of sorts. Just a little over a year ago the Timex Corp. killed the 2068 in spite of strong support by both consumers and the computer press. And now, here is their Portugal counterpart bringing back almost the same computer to the American market. It isn't quite known exactly what Timex (U.S.) role in Portugal is and what are the controlling interests. It is known however, that both Portugal and the U.S. owned Sinclair technology rights, and when Timex U.S. dropped out, Portugal continued to use and produce that technology.

Antonio Gomez told Bob Dyl that if everything goes as planned, they should start shipping units by the end of May. As far as what marketing strategies are going to be used, and who will sell the computers and drives...the details are sketchy. Most of the Sinclair vendors that still exist here, have expressed interest.

The old Timex/Sinclair 2068 that we are familiar with has maintained its silver case and keyboard, but has been retitled simply the "Timex 2068".

It's main circuit board has been a complete redesign, but has maintained the two ROM system, the sound chip, and the joystick ports. It now operates on nine volts instead of fifteen in the original model. In the cartridge port is a plug-in type Spectrum emulator board, and the rear connector has been reconfigured to be the same as that of a Spectrum. So basically, what you have is a Spectrum in 2068 clothes, with some of the subtle advantages of the 2068 remaining intact.

A nice addition to the Timex 2068 is it's accompanying disk drive system called the "Timex FDD." It is a four piece package with a power supply, interface, controller board, and a 3" Hitachi drive. The disk operating system is called (TOS). A CP/M board may be released a little later. Portugal is also planning to market the disk system for the U.S. T/S 2068 also, with a suitable interface for that computer.

Retail pricing for the 2068 and FDD has not been set as of yet, and Gomez told Bob Dyl that they were going increase the prices from which they first estimated.

Reaction has been mixed to this major announcement by Timex. Criticism and skepticism has been voiced by those who still bear the scars from when Timex left the computer market a short while ago. Some disappointment has been expressed as to the incompatibility with existing hardware that has been developed over the past year for the old 2068. But the excitement is spreading for the most part, as Sinclair users in general here in the U.S. can expect to see much on it's way as far as support for the 2068/Spectrum is concerned. Quite a bit of software and hardware will no doubt be heading this way from major English companies.

Time Designs Magazine would like to express thanks and appreciation to Bob Dyl of the English Micro Connection, for releasing this information to the American Timex and Sinclair users.

INTRODUCTION TO COMPUTER CONTROL

by Bruce C. Taylor
Tucson, Arizona



OK all you T/S 2068 buffs, dust off that ZX81 or T/S 1000 (excuse me for a moment ZX81 and T/S 1000 users) and let's do some serious things with your computer. No, I'm not talking about doing your income taxes, balancing your checkbook or writing your first novel. When I say serious, I mean controlling something with your computer. Although you can use your T/S 2068...your ZX81 or T/S 1000 will do the job very nicely too.

Control what, with your computer? Control anything you think might be nice to control. Your lights, your garage door, your coffee pot or even your personal robot. PERSONAL ROBOT? Yes, your lowly T/S 1000 (excuse me again ZX81 and T/S 1000 users) is very capable of nearly anything you want to control with a computer. Remember those personal computer experts who brushed off the Sinclair and Timex computers as mere "toys" good only for learning about the basics of computing, but not for "serious" computing? Those "experts" now say you shouldn't tie up a personal computer with mundane home control tasks. Well, the experts can be correct half the time.

Even in the face of current 16 bit and soon to come 32 bit home computers, don't let anyone sell the 8 bit Z80 CPU computers short. The 8080 based computers are an excellent choice for control applications. If you don't believe me, look to Japan where an assault on the small computer market has been launched with their MSX (MICROSOFT EXTENDED) computers. One of the prime reasons they selected the Z80A CPU was because of its potential for control applications.

In your ZX81 or T/S 1000 computers (include the T/S 1500, T/S 2068 and SPECTRUM too) you have the

makings of a very capable computer control system. All you need to get started "interfacing with the world" is to add an input/output (I/O) board to your computer.

But wait a minute, before I launch into the details, you may have the following question. Why build a control project from scratch when I can buy a robot or home control/security system out of a box? First of all, it will probably be cheaper to build it yourself. Also, if you are inclined to tinker and build, you can continually expand and upgrade your system as you desire. This allows you to take advantage of new equipment/component advances, not to mention software upgrades.

For example, if you built a personal robot as I have done, you may have designed the controlling software to use the input avoidance technique of navigating around the house. With the addition of a range measuring device, like the Polaroid Ultrasonic Ranging Device, you can advance the navigation capabilities to a goal seeking ability. This can be done by modifying the software so that the robot seeks open areas to navigate through, much like you seek a doorway as opposed to avoiding walls in a room.

Back to the problem of building an I/O interface for your computer. Several options are available. One was described in a series of articles in RADIO-ELECTRONICS MAGAZINE last year. Another is an inexpensive I/O board offered by BUDGET ROBOTICS & COMPUTING of Tucson, Arizona. Both offer eight parallel lines of input and output, and use simple machine code subroutines to give a very fast I/O capability. How fast? The Budget Robotics board includes documentation for a simple optical encoder that can measure inputs up to several hundred pulses a second, and all for only a

few dollars. Is that fast enough and cheap enough to entice you to get on with this computer control area of interest?

Budget Robotics in fact offers an expanding line of peripherals including a buffered buss expansion board (currently for ZX81, T/S 1000 and T/S 1500) to allow you to add an almost limitless number of items in your computer control project. In fact, I have written a book describing these and other projects, to be published by early 1986 by TAB BOOKS. The centerpiece of the book is "H.E.N.R.Y." an internally computer controlled personal robot. He won a Golden Droid Award for Most Entertaining at the First International Personal Robot Congress & Exposition in Albuquerque, New Mexico last spring. What computer is inside H.E.N.R.Y.? You guessed it, a Sinclair ZX81. Hardware and software for all control projects is fully explained in the book. A home control interface is also described.

The expansion board used is the one originally built by COMPUTER CONTINUUM, but has been improved. This board can also be used to build a memory bank switching capability as described in Paul Hunter's series of articles in T-S HORIZONS Magazine. Using Paul's non-volatile memory board, control routines can be created and saved for instant loading into computer memory and easily changed as upgrades to your control project are needed. This method is cheaper and easier than burning Programmable Read Only Memory (PROM) chips, or trying to buy Electrically Erasable PROM (EEPROM) chips.

Other expansion boards and I/O circuits can be used which will also do a good job. John Oliger described an expansion board in a Winter 1982 SYNTAX QUARTERLY article. An I/O circuit using the 8255 PPI (Programmable Peripheral Interface) integrated circuit chip is not as fast (no machine code) as the RX-81

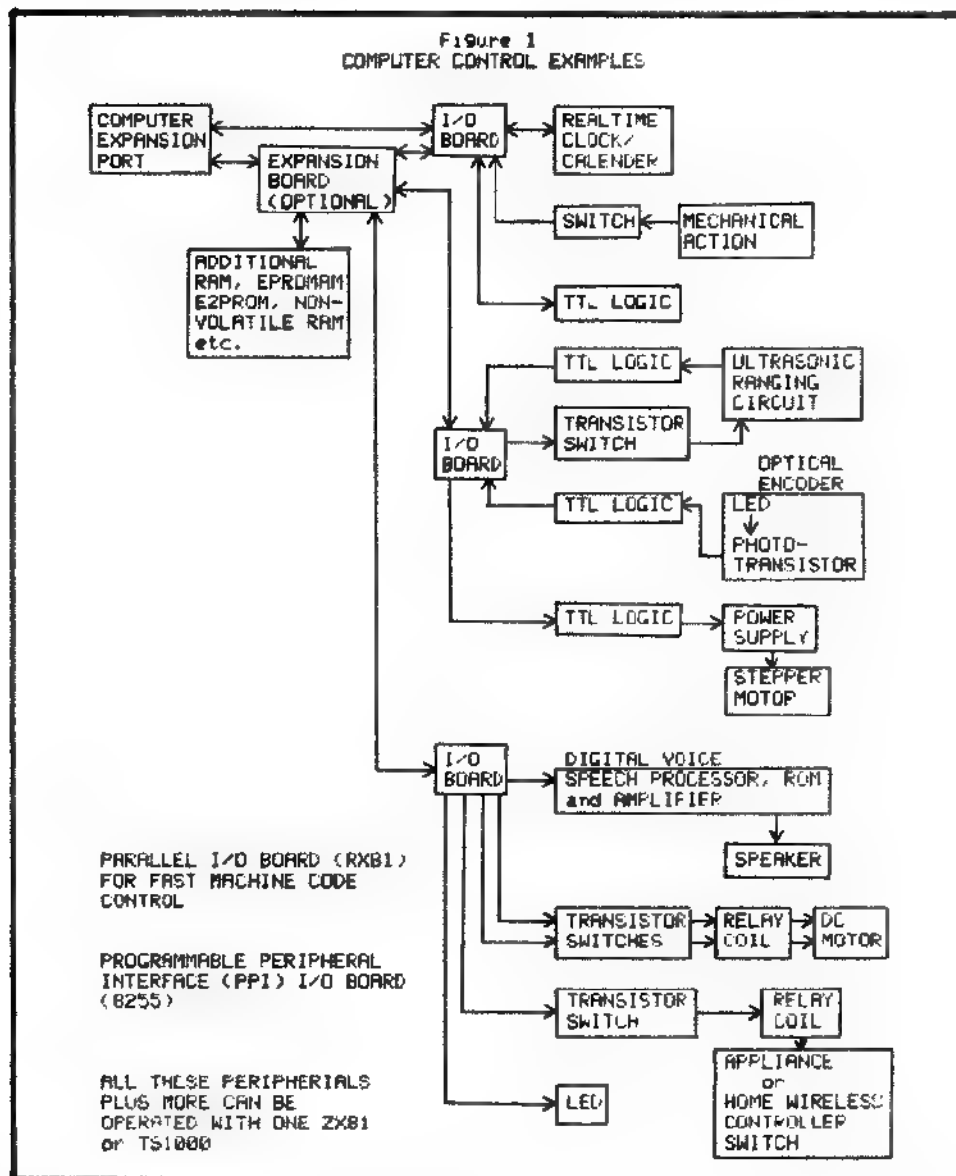
I/O circuit, but works fine in many applications. Wiring of the 8255 circuit is included in Budget Robotics expansion board documentation and is described in my book.

To give you an idea of the range of control applications I am proposing, refer to Figure 1 as you read the rest of this article. Starting with the computer expansion port at the rear of your computer, you will want to add an expansion board if you expect to add more than two peripherals. Next you will need at least one input/output (I/O) board. The number and type of I/O boards will depend on what and how much you want to control. For example, you could easily add up to four RX-81 I/O boards and an 8255 PPI giving you up to either 56 input and 32 output lines or 32 input and 56 output lines. Each peripheral, as described in Figure 1, may require anywhere from one input line (optical encoder) to four input and seven output lines (realtime clock).

The following are examples using the RX-81 I/O board: A realtime clock/calendar using seven output plus four input lines to read the time. A mechanical switch can be read by connecting an input line to ground. A transistor to transistor logic (TTL) state of low can be read directly by an input line. A logic high state can be read if inverted first, using a 74LS04 IC chip. The Polaroid (TM) Ultrasonic Ranging Circuit requires one output line to initiate a pulse transmit and one input line to read the return pulse. One input line is all that is required to read the status of a phototransistor in the optical encoder.

The following are examples using the 8255 PPI circuit: Two output lines are used to control a stepper motor driver with one line designating the direction of the motor rotation, and the other producing the step pulse. Ten output lines are used to control the

Figure 1
COMPUTER CONTROL EXAMPLES

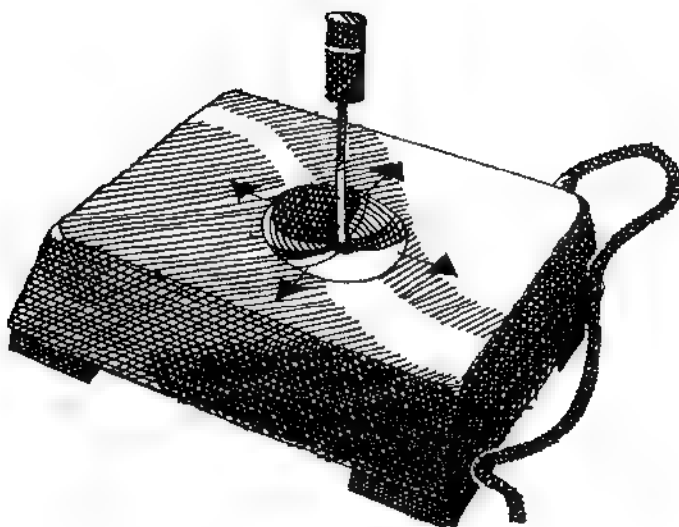


Digitaltalker (TM) Digital Voice Circuit with two ROM (Read Only Memory) word sets with eight lines used to select the word; one to select the ROM word set and one to activate the processor to produce the word.

The following are examples of control easily accomplished using either of the I/O circuits mentioned: Two output lines are required to control a direct current (DC) motor and select either direction where one output line is used for forward and one reverse. Each drives its own transistor switch which in turn activates a double pole, double throw (DPDT) relay coil. The coils are cross wired to the normally closed terminal of the opposite relay so that power to the motor cannot accidentally be applied in

both polarities at the same time, causing a direct short circuit. For appliance or home wireless control switching, one output line is required for each on/off switch. Here each output line controls a transistor switch which in turn controls a relay. A light emitting diode (LED) can be activated in conjunction with any output line activity.

These examples are provided as food for thought. You can control virtually anything with your computer. Just use discretion. I would not recommend trying to control Aunt Mary's respirator. One last point, all the examples in Figure 1, plus more, can be controlled together by a single computer (ZX81, T/S 1000, ect.). Happy controlling.



MACHINE CODE JOYSTICK ROUTINE

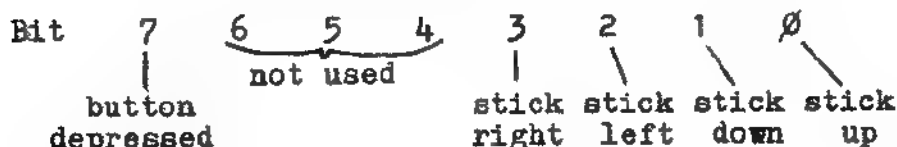
FOR THE T/S 2068

by John McMichael
Bozeman, Montana

The following is a compact machine code routine that provides a 2068 user with digital joystick position information and button status at machine code speeds. It was originally designed to be of use in upgrading game programs from keyboard control to joystick control.

Basically, the two joysticks are controlled via Register 14 of the Programmable Sound Generator Chip. Addresses are transferred by port #245 and data by port #246. To read a joystick, 14 is written to port #245, the B register is loaded with stick no., and the data is read from port #246 as a single byte with direction/button status bits located as shown in fig. 1.

FIG. 1 - JOYSTICK DATA BYTE




The routine, as presented in this article, resides in a 1 REM statement, although it can easily be relocated.

Providing the second display file is not used, the first available address in a 1 REM statement is 26715. This and the next four addresses are where the results of reading a joystick will be stored (see fig. 2). After the routine is called, a 1 will be found in the addresses corresponding to positive switch closures and 0's in those addresses corresponding to negative or "open" switch conditions.

FIG. 2 - JOYSTICK DATA LOCATIONS

ADDRESS	DATA
26715	STICK RIGHT
26716	STICK LEFT
26717	STICK DOWN
26718	STICK UP
26719	"FIRE" BUTTON

The program in fig. 3 is a machine code loader which puts the machine code into the 1 REM statement.

As the resulting 1 REM machine code lint is partially unlistable, any subsequent program lines will be unlistable unless...the  cursor is set to a line no. equal to or larger than the next line no. after the 1 REM and the following two direct commands are entered: POKE 23660, (your next program line above the 1 REM line): POKE 23661,0. This will cause the automatic listing to start at your first program line.

Enter and RUN the following machine code loader:

FIG. 3 - MACHINE CODE LOADER

```

1 REM
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95
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98
99
100

```

Lines 10-40 of the loader can be DELETED and the remaining 1 REM machine code line can be SAVED to be later MERGED with any program that is being up-graded to joystick control.

At the point in a program where joystick information is needed, address #26736 is POKED with the desired joystick's no. (1-LEFT; 2-RIGHT) and the routine is called at 26720.

By PEEKING addresses 26715-26719, the sticks' position and button status are obtained.

The following program is a typical example of how the routine may be used to move a single character around the screen with a joystick. The program will stop when the "fire" button is pressed.

FIG. 4 - EXAMPLE PROGRAM

1 REM ???7771(h777q# → the remainder is unlistable

```

10 LET X=26715 LET vert=10
20 PRINT AT vert,horiz,
30 RANDOMIZE USR 26720 REM ++
the right stick is selected++
40 LET verticle=vert+PEEK X+2
-PEEK (X+3)
50 LET horizontal=horiz+PEEK
-PEEK (X+1)
60 IF verticle<0 OR verticle >
1 THEN GO TO 30
70 IF horizontal<0 OR horizontal
>31 THEN GO TO 30
80 PRINT AT verticle,horizonta
;"#"
90 LET vert=verticle LET hori
z=horizontal
100 IF PEEK (X+4)=1 THEN STOP
110 GO TO 20

```

Fig. 5 is the OP CODE listing for the 1 REM routine.

FIG. 5 - OP CODE LISTING

0000	0000	0000	0000
0001	0001	0001	0001
0002	0002	0002	0002
0003	0003	0003	0003
0004	0004	0004	0004
0005	0005	0005	0005
0006	0006	0006	0006
0007	0007	0007	0007
0008	0008	0008	0008
0009	0009	0009	0009
000A	000A	000A	000A
000B	000B	000B	000B
000C	000C	000C	000C
000D	000D	000D	000D
000E	000E	000E	000E
000F	000F	000F	000F
0010	0010	0010	0010
0011	0011	0011	0011
0012	0012	0012	0012
0013	0013	0013	0013
0014	0014	0014	0014
0015	0015	0015	0015
0016	0016	0016	0016
0017	0017	0017	0017
0018	0018	0018	0018
0019	0019	0019	0019
001A	001A	001A	001A
001B	001B	001B	001B
001C	001C	001C	001C
001D	001D	001D	001D
001E	001E	001E	001E
001F	001F	001F	001F
0020	0020	0020	0020
0021	0021	0021	0021
0022	0022	0022	0022
0023	0023	0023	0023
0024	0024	0024	0024
0025	0025	0025	0025
0026	0026	0026	0026
0027	0027	0027	0027
0028	0028	0028	0028
0029	0029	0029	0029
002A	002A	002A	002A
002B	002B	002B	002B
002C	002C	002C	002C
002D	002D	002D	002D
002E	002E	002E	002E
002F	002F	002F	002F
0030	0030	0030	0030
0031	0031	0031	0031
0032	0032	0032	0032
0033	0033	0033	0033
0034	0034	0034	0034
0035	0035	0035	0035
0036	0036	0036	0036
0037	0037	0037	0037
0038	0038	0038	0038
0039	0039	0039	0039
003A	003A	003A	003A
003B	003B	003B	003B
003C	003C	003C	003C
003D	003D	003D	003D
003E	003E	003E	003E
003F	003F	003F	003F
0040	0040	0040	0040
0041	0041	0041	0041
0042	0042	0042	0042
0043	0043	0043	0043
0044	0044	0044	0044
0045	0045	0045	0045
0046	0046	0046	0046
0047	0047	0047	0047
0048	0048	0048	0048
0049	0049	0049	0049
004A	004A	004A	004A
004B	004B	004B	004B
004C	004C	004C	004C
004D	004D	004D	004D
004E	004E	004E	004E
004F	004F	004F	004F
0050	0050	0050	0050
0051	0051	0051	0051
0052	0052	0052	0052
0053	0053	0053	0053
0054	0054	0054	0054
0055	0055	0055	0055
0056	0056	0056	0056
0057	0057	0057	0057
0058	0058	0058	0058
0059	0059	0059	0059
005A	005A	005A	005A
005B	005B	005B	005B
005C	005C	005C	005C
005D	005D	005D	005D
005E	005E	005E	005E
005F	005F	005F	005F
0060	0060	0060	0060
0061	0061	0061	0061
0062	0062	0062	0062
0063	0063	0063	0063
0064	0064	0064	0064
0065	0065	0065	0065
0066	0066	0066	0066
0067	0067	0067	0067
0068	0068	0068	0068
0069	0069	0069	0069
006A	006A	006A	006A
006B	006B	006B	006B
006C	006C	006C	006C
006D	006D	006D	006D
006E	006E	006E	006E
006F	006F	006F	006F
0070	0070	0070	0070
0071	0071	0071	0071
0072	0072	0072	0072
0073	0073	0073	0073
0074	0074	0074	0074
0075	0075	0075	0075
0076	0076	0076	0076
0077	0077	0077	0077
0078	0078	0078	0078
0079	0079	0079	0079
007A	007A	007A	007A
007B	007B	007B	007B
007C	007C	007C	007C
007D	007D	007D	007D
007E	007E	007E	007E
007F	007F	007F	007F
0080	0080	0080	0080
0081	0081	0081	0081
0082	0082	0082	0082
0083	0083	0083	0083
0084	0084	0084	0084
0085	0085	0085	0085
0086	0086	0086	0086
0087	0087	0087	0087
0088	0088	0088	0088
0089	0089	0089	0089
008A	008A	008A	008A
008B	008B	008B	008B
008C	008C	008C	008C
008D	008D	008D	008D
008E	008E	008E	008E
008F	008F	008F	008F
0090	0090	0090	0090
0091	0091	0091	0091
0092	0092	0092	0092
0093	0093	0093	0093
0094	0094	0094	0094
0095	0095	0095	0095
0096	0096	0096	0096
0097	0097	0097	0097
0098	0098	0098	0098
0099	0099	0099	0099
009A	009A	009A	009A
009B	009B	009B	009B
009C	009C	009C	009C
009D	009D	009D	009D
009E	009E	009E	009E
009F	009F	009F	009F
00A0	00A0	00A0	00A0
00A1	00A1	00A1	00A1
00A2	00A2	00A2	00A2
00A3	00A3	00A3	00A3
00A4	00A4	00A4	00A4
00A5	00A5	00A5	00A5
00A6	00A6	00A6	00A6
00A7	00A7	00A7	00A7
00A8	00A8	00A8	00A8
00A9	00A9	00A9	00A9
00AA	00AA	00AA	00AA
00AB	00AB	00AB	00AB
00AC	00AC	00AC	00AC
00AD	00AD	00AD	00AD
00AE	00AE	00AE	00AE
00AF	00AF	00AF	00AF
00B0	00B0	00B0	00B0
00B1	00B1	00B1	00B1
00B2	00B2	00B2	00B2
00B3	00B3	00B3	00B3
00B4	00B4	00B4	00B4
00B5	00B5	00B5	00B5
00B6	00B6	00B6	00B6
00B7	00B7	00B7	00B7
00B8	00B8	00B8	00B8
00B9	00B9	00B9	00B9
00BA	00BA	00BA	00BA
00BB	00BB	00BB	00BB
00BC	00BC	00BC	00BC
00BD	00BD	00BD	00BD
00BE	00BE	00BE	00BE
00BF	00BF	00BF	00BF
00C0	00C0	00C0	00C0
00C1	00C1	00C1	00C1
00C2	00C2	00C2	00C2
00C3	00C3	00C3	00C3
00C4	00C4	00C4	00C4
00C5	00C5	00C5	00C5
00C6	00C6	00C6	00C6
00C7	00C7	00C7	00C7
00C8	00C8	00C8	00C8
00C9	00C9	00C9	00C9
00CA	00CA	00CA	00CA
00CB	00CB	00CB	00CB
00CC	00CC	00CC	00CC
00CD	00CD	00CD	00CD
00CE	00CE	00CE	00CE
00CF	00CF	00CF	00CF
00D0	00D0	00D0	00D0
00D1	00D1	00D1	00D1
00D2	00D2	00D2	00D2
00D3	00D3	00D3	00D3
00D4	00D4	00D4	00D4
00D5	00D5	00D5	00D5
00D6	00D6	00D6	00D6
00D7	00D7	00D7	00D7
00D8	00D8	00D8	00D8
00D9	00D9	00D9	00D9
00DA	00DA	00DA	00DA
00DB	00DB	00DB	00DB
00DC	00DC	00DC	00DC
00DD	00DD	00DD	00DD
00DE	00DE	00DE	00DE
00DF	00DF	00DF	00DF
00E0	00E0	00E0	00E0
00E1	00E1	00E1	00E1
00E2	00E2	00E2	00E2
00E3	00E3	00E3	00E3
00E4	00E4	00E4	00E4
00E5	00E5	00E5	00E5
00E6	00E6	00E6	00E6
00E7	00E7	00E7	00E7
00E8	00E8	00E8	00E8
00E9	00E9	00E9	00E9
00EA	00EA	00EA	00EA
00EB	00EB	00EB	00EB
00EC	00EC	00EC	00EC
00ED	00ED	00ED	00ED
00EE	00EE	00EE	00EE
00EF	00EF	00EF	00EF
00F0	00F0	00F0	00F0
00F1	00F1	00F1</	

A GRAPHICS PROBLEM for the T/S2068

A "SERIOUS" GRAPHICS DISPLAY FOR THE 2068 AND 2040 PRINTER

by Dick F. Wagner
Canby, Oregon

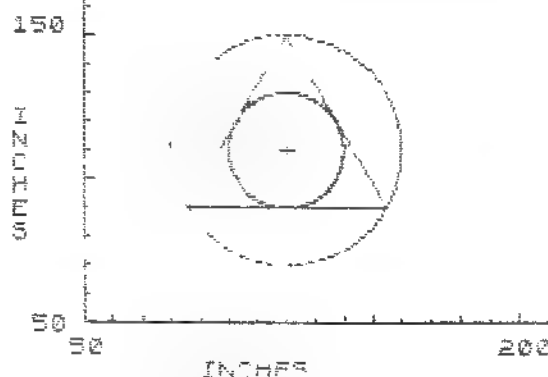


One of my pet beefs with many computer programmers is their lack of concern for identifying the basis for their programs. The display of the formulas/equations used, would help the user decide if the program is indeed the one needed for his (or her) calculations. It is often not easy to pick this information out of the program because of the way the programmer had to chop up the formula/equation. Also there should not be the need to spend a lot of time trying to identify the information needed.

The following program is substantiated as to formulas. This makes it easy to substitute as you wish. However the problem is complex in that several systems are involved in developing a problem display. The formal graph with x and y axis, notations and scales provide an example for similar displays. The derivations for generating an equilateral triangle as well as drawing an inner and outer circle touching the triangle shows the steps. The chart coordinates have suitable divisions marked off, as well as enhancing every 5th division. The end product, instead of just displaying a triangle and 2 circles, shows the result of calculating a problem with interpretive results.

The first step is to draw the x and y axis, scales, divisions and headings. The radius of the outer circle is to be 40 inches. Use a scale of one pixel as one inch. Therefore, we need to provide for a figure 80 by 80. For a nice balance, place the circle center at 95 (x axis) and 80 (y axis). To allow space for x and y axis data place the x axis 20 and the y axis at 25. Position markers every 10 pixels (inches) and enhance every 5th mark. Remember that all positions are with respect to 0,0 for PLOT (bottom left corner) and 0,0 for PRINT (top left corner).

GRAPHIC PLOTS OF
AN EQUILATERAL TRIANGLE
WITH INNER AND OUTER
CIRCLES
D.F.W. 2/85



Lines 10-190 generate the axis, markers, axis numbers and axis names. Many lines include a printer correction factor of 1.24 (Timex 2040 Printer). This is necessary to produce a symmetrical image. After all, who wants to excuse his (or her) equipment for making egg-shaped circles and non-equilateral triangles?

To review the derivation of the correction factor, just DRAW a square of good size, and make a printer copy. Measure the height and width (use a decimal or metric scale). The ratio of these dimensions is the correction factor. Now re-draw the square, using this multiplier. For example, assume the square was drawn with PLOT 30,30: DRAW 80,0: DRAW 0,80: DRAW -80,0: DRAW 0,-80. For the 2040 Printer, you would change the 1st and 3rd DRAW to 1.24*80,0 and -80*1.24,0. Check your printer to see if it is the same.

Lines 45-110 put in the markers on the x axis, and lines 120-190 put in the y axis markers. RUN the program from 10-190 and confirm proper display. CLS and the "graph paper" is now ready to plot the 3 figures. It is now time to calculate the dimensions for the figures and decide where to place them. Remember that we are going to have a display with measuring capability of the finished figures.

Calculations start with determining the sides of the equilateral triangle from one dimension, the radius of the outer circle. That has been given as 40 inches (3rd paragraph). Key in lines 395-470. DELETE later if desired. This part will draw a right triangle (any scale) and from the hypotenuse (the radius of the outer circle), we can determine $\frac{1}{2}$ the base and the radius of the inner circle.

These formulas will be used:

$$b = a \cdot \sin B / \sin A$$

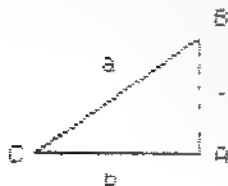
$$c = a \cdot \sin C / \sin A$$

$$\text{circle} = r \cdot \cos 2\pi i, r \cdot \sin 2\pi i$$

a is radius (40), b is $\frac{1}{2}$ the base of the equilateral triangle and c is the radius of the inner circle. All is shown on the sketch. We know that an equilateral triangle has all angles equal to 60 degrees. A line drawn vertically bisecting the base will also pass thru the circle center. RUN the program from 395, and display the triangle along with the calculations. Angle B may not be evident, so consider B as $\frac{1}{2}$ of one third of 360 degrees.

TRIANGLE CALCULATIONS

b=1/2 base, c=radius center to base, a=radius
(given as 40).



a=40 (radius)
B=1/2*120=60 deg.
A=90 deg.
C=180-90-60 =
30 degrees
c=40*SIN 60/
SIN 90=34.64
b=40*SIN 30/
SIN 90=20

There are all the dimensions required.

Lines 200-320 draw the 3 figures with center at 95,80.

Lines 330-370 put in a title, initials (yours) and date.

I think you will agree that our computers can produce a product that takes it out of just a visual display.

5 REM Lines constructed at right angle and at the midpoint of each side of an equilateral triangle will intersect. This point will be the center of a circle that will touch each side and also a circle will touch each corner of the triangle.

10 PLOT 25+1.24 20 DRAW 0,145
PLOT 25+1.24 20 DRAW 200,0

```

20 PRINT AT 21 10, "INCHES"
30 PRINT AT 20,0 "I" AT 11 0
40 PRINT AT 12,0 "H" AT 12 0 "H" 14
50 E AT 15 2 6
60 PRINT AT 22 3 50 AT 20,25
700
80 PRINT AT 1= 1 "50 AT 5 0
150
48 FOR N=25+1.24 TO 220 STEP 1
0+1.24
52 FOR I=60 TO 22
60 PLOT 25+1.24 I
70 LEAT I NEXT N
80 FOR N=25+1.24 TO 220 STEP 5
0+1.24
92 FOR B=22 TO 24
100 PLOT N B
110 NEXT B NEXT N
120 FLB M=20 TO 150 STEP 10
130 FOR B=25+1.24 TO 27+1.24
140 PLOT B M
150 NEXT B NEXT M
160 FOR M=20 TO 150 STEP 50
170 FOR B=27+1.24 TO 29+1.24
180 PLOT B M
190 NEXT B NEXT M
200 PLOT 95+1.24 80
210 DRAW 90,200+.5+1.24,0
220 DRAW 94,24+1.24,60
230 DRAW 94,64+1.24,-60
240 DRAW 94,64+1.24 0
250 REM Center is 95 80
260 PLOT 95+1.24,80-2 DRAW 0,4
270 PLOT 95-2+1.24 80 DRAW 6,0
280 FOR B=0 TO 2*PI STEP PI/120
290 PLOT 95+1.24+40*1.24*COS B,
300+40*SIN B
310 PLOT 95+1.24+20*1.24*COS B
320+20*SIN B
330 NEXT B
340 PRINT AT 0 11, "GRAPHIC PLOT
5 OF
340 PRINT AT 1 8, "AN EQUILATERA
L TRIANGLE
350 PRINT AT 2,9, "WITH INNER AN
D OUTER
360 PRINT AT 3 15 "CIRCLES"
370 PRINT AT 4,18, "D.F.W. 2 85
380 COP
390 PAUSE 424
390 CLS
395 PRINT TRIANGLE CALCULATION
400 PRINT b=1/2 base c=radius
center to base, a=radius
radius (given as 40).
400 PLOT 20,20 DRAW 70,0 DRAW
0 40 DRAW 120 -40
410 PRINT AT 13,1 "C" AT 19 12
420 PRINT AT 13,12 "B"
420 PRINT AT 20,6 "b" AT 16 12
430 PRINT AT 15 6 "a"
430 PRINT AT 13,15 "a=40 (radius)
440 PRINT AT 14 15 "B=1/2*120=60 deg.
450 PRINT AT 15,15 "A=90 deg." AT 16,15
460 PRINT AT 17,16 "C=180-90-60=30 degrees
470 PRINT AT 18,15, "b=40*SIN 60
480 PRINT AT 19,15; SIN 90=3
4.64
490 PRINT AT 20,15, c=40*SIN 30
470 PRINT AT 21,15, SIN 90=2
0
480 COP

```



2068 PROGRAM

SLOT MACHINE

by Bill Gunter
Sacramento, California

REAL LAS VEGAS STYLE CASINO ENTERTAINMENT!

The program is a slot machine which plays 25 cent pieces, and keeps track of your winnings and losses (it even plays a little fanfare if you hit the jackpot). The odds ought to be pretty close to Nevada odds, and should keep the children quiet for hours. It is important to get the spacing just right in line 15, since the "fruit" which appear in the slot machine windows are "slices" of the character string "A\$". (EDITOR'S NOTE: this listing was made with a printer that doesn't use "0" for zero. So be careful when entering numbers in this program.)

```

1 REM *****
2 REM *BILLY'S SLOT MACHINE*
3 REM *****
4 INK 1
5 LET P=0
6 PAPER 6
7 BORDER 6
8 CLS
9 LET S=500
10 GO SUB 1000
11 PRINT AT 1,28;S
12 PAUSE 150
13 LET A$="CHERRYLEMON PLUM ORANGE BELL -BAR-CHERRY"
14 PAPER 6
15 GO TO 21
20 FOR J=1 TO 22
21 PRINT AT 7,20;" "
25 PRINT AT 10,J;" "
30 PRINT AT 11,J;" "
35 PRINT AT 12,J;" "
39 PRINT AT 20,1;"3 BAR OR BELL=JACKPOT"
40 NEXT J
55 DIM B$(3,6)
60 FOR J=1 TO 3
65 LET B$(J)=A$(1+6*INT(RND*7) TO 42)
67 IF B$(J)="CHERRY" THEN PAPER 2
68 IF B$(J)="LEMON" THEN PAPER 6
69 IF B$(J)="PLUM" THEN PAPER 3
70 IF B$(J)="ORANGE" THEN PAPER 2: INK 6
71 IF B$(J)="BELL" THEN PAPER 0: INK 6
72 IF B$(J)="-BAR-" THEN PAPER 7: INK 0
73 PRINT AT 11,7*J-5;B$(J)
74 BEEP .05,15
75 PAPER 6: INK 1
76 NEXT J
77 PLOT 214,49
79 DRAW 0,55: DRAW 2,0: DRAW 0,23: DRAW -8,0: DRAW 0,-25: DRAW 2,0: DRAW 0,-55
80 GO SUB 2000
81 PRINT AT 7,2;"DEPOSIT 2 BITS-->"
82 PRINT AT 7,21:FLASH 1;"D"
83 IF INKEY$="d" OR INKEY$="D" THEN PRINT AT 7,2;" "
84 GO TO 83
85 PRINT AT 6,28;"PULL": PRINT AT 7,27;"<----"
86 PRINT AT 7,26:FLASH 1;"P"
87 LET S=S-25: PRINT AT 1,28;S
88 IF INKEY$="p" OR INKEY$="P" THEN GO TO 91
89 GO TO 89
91 PRINT AT 5,26;" "; AT 6,26;" "; AT 7,26;" "; AT 8,26;" "; AT 9,
26;" "; AT 10,26;" "; AT 11,26;" "; AT 12,26;" "; AT 13,26;" "; AT 14,26;" "
95 GO TO 20
1000 PRINT
1001 PLOT 0,4
1002 DRAW 192,0
1003 DRAW 0,148
1004 DRAW -192,0
1005 DRAW 0,-148
1006 PLOT 192,24
1007 DRAW 8,0
1008 DRAW 0,40
1009 DRAW -8,0
1010 PLOT 200,40

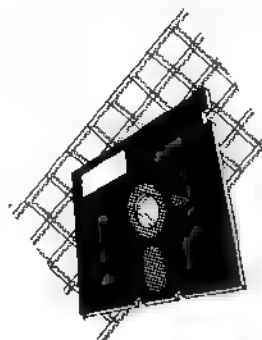
```

```

1011 DRAW 12,0
1012 PLOT 200,48
1013 DRAW 12,0
1014 CIRCLE 212,44,5
1015 PLOT 210,49
1016 DRAW 0,55
1017 PLOT 214,49
1018 DRAW 0,55
1019 DRAW 2,0
1020 DRAW 0,23
1021 DRAW -8,0
1022 DRAW 0,-23
1023 CIRCLE 172,116,14
1024 PLOT 6,70
1025 DRAW 180,0
1026 DRAW 0,28
1027 DRAW -180,0
1028 DRAW 0,-28
1029 PRINT AT 4,5;"BILLYS SLOT"
1030 PRINT AT 5,7;"MACHINE"
1031 PRINT AT 14,4;"2 CHERRY PAYS 2"
1034 PRINT AT 15,4;"3 CHERRY PAYS 5"
1035 PRINT AT 16,4;"2 PLUM PAYS 5"
1036 PRINT AT 17,4;"3 PLUM PAYS 10"
1037 PRINT AT 18,4;"2 ORANGE PAYS 5"
1038 PRINT AT 19,4;"3 ORANGE PAYS 10"
1039 PRINT AT 1,15;"YOU NOW HAVE"
1040 RETURN

```

COMING NEXT ISSUE...



THE
FLOPPY
DISK
INVASION

our spectacular summer issue!

```

2010 IF B$(1)=B$(2) AND B$(1)="CHERRY" THEN LET P=50: PRINT AT 1,1; FLASH 1;"YOU WIN ";P
2011 IF B$(1)=B$(2) AND B$(1)=B$(3) AND B$(1)="CHERRY" THEN LET P=125: PRINT AT 1,1; FLASH 1;"YOU WIN ";P
2012 IF B$(1)=B$(2) AND B$(1)="PLUM" THEN LET P=125: PRINT AT 1,1; FLASH 1;"YOU WIN ";P
2013 IF B$(1)=B$(2) AND B$(1)=B$(3) AND B$(1)="PLUM" THEN LET P=250: PRINT AT 1,1; FLASH 1;"YOU WIN ";P
2014 IF B$(1)=B$(2) AND B$(1)="ORANGE" THEN LET P=125: PRINT AT 1,1; FLASH 1;"YOU WIN ";P
2015 IF B$(1)=B$(2) AND B$(1)=B$(3) AND B$(1)="ORANGE" THEN LET P=250: PRINT AT 1,1; FLASH 1;"YOU WIN ";P
2016 IF B$(1)=B$(2) AND B$(1)="LEMON" THEN PRINT AT 1,1; FLASH 1;"SORRY, NO WIN"; PAUSE 100
2017 IF B$(1)=B$(2) AND B$(1)=B$(3) AND B$(1)="BAR" THEN PRINT AT 1,1; FLASH 1;"JACKPOT - $10"; LET P=1000: GO SUB 4000
2018 IF B$(1)=B$(2) AND B$(1)=B$(3) AND B$(1)="BELL" THEN PRINT AT 1,1; FLASH 1;"JACKPOT - $10"; LET P=1000: GO SUB 4000
2019 LET S=S+P
2020 PRINT AT 1,28;" "
2021 PRINT AT 1,28;S
2022 LET P=0
2025 IF S=0 THEN GO TO 3000
2040 PAUSE 75
2050 PRINT AT 1,1;" "
2060 RETURN
3000 PRINT AT 1,0;"YOU ARE BUSTED-FOR REPLAY HIT "; FLASH 1;"R"
3010 IF INKEY$="R" THEN RUN
3020 GO TO 3010
4000 BEEP .2,-3: BEEP .2,2: BEEP .2,6: BEEP .4,7: BEEP .2,6: BEEP .8,9
4010 RETURN

```




VAMP

tv to monitor kit

by Dennis Jurries
Oregon City, Oregon

If you want to get rid of un-wanted lines, and improve your TV picture without paying over \$200, then this conversion kit is for you.

I sent \$39 to VAMP Inc., and 10 days later I received a package containing a circuit board, a package containing resistors, capacitors, and a few other parts, along with an eight page instruction manual with schematics. After a couple hours of assembling the PC board and mounting a TV/monitor switch, and the PC board...I was ready to make the circuit/TV connections.

Next, I went out and paid \$8.50 for a Sams Photofact, for my model of TV (Sanyo). The instruction manual tells where, and shows typical examples of where to make the connections. I would still recommend that you either have experience with TV's or know someone who has, and will help you with this part of the project. I made three wrong connections before getting it right.

The final result is a color monitor/TV with a picture every bit as good as that of a dedicated new monitor, for a total of approximately \$48 and a few hours labor.

You can obtain the TV To Monitor Conversion Kit from: VAMP Inc., PO Box 411, Los Angeles, CA, 90028.

TASWORD TWO TIPS



by William D. Erickson
and
Paul T. Erickson
Decatur, Georgia

1.

Many of us that use TASWORD TWO are bothered by one thing that spoils all the fun. This is the fact that once you have printed something on your 80 col. printer, you can not again print with your T/S 2040 Printer without going through a big hassel. Also, many of the command functions of the program also produce the same result and leave the user who only has the T/S 2040 Printer between a rock and a hard place.

To correct this problem, go to the main menu by using SYMBOL-SHIFT A, exit to BASIC by pressing b, then add this line to the BASIC portion of the program:

```
29 POKE 26703,0 : POKE 26704,5
```

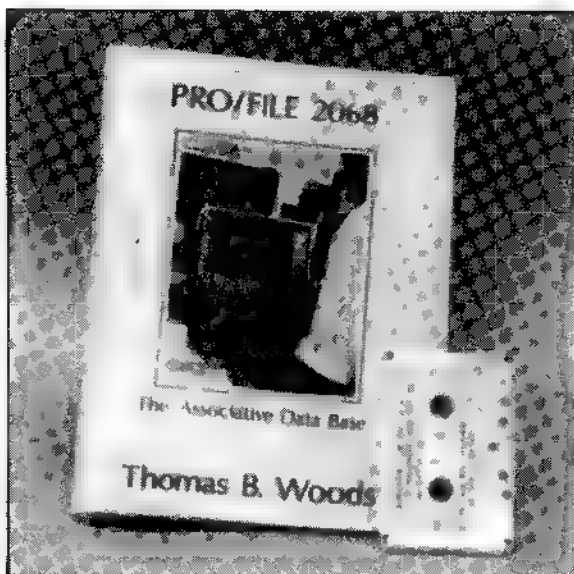
Now GOTO 25, and save this version of the program by pressing "t".

Now any time your T/S 2040 fails to print, all you have to do is use: SYMBOL-SHIFT A, then press "y" to return to your text and print to your hearts content. This in no way interferes with your 80 col. printer.

2.

LARGE PRINT
USING TASWORD TWO
and a
T/S 2040 PRINTER

Set right margin to 32 columns. Set window to a 32 col. screen. Stay in this mode when you print your text. All other aspects remain the same. Large print still works, just more so.



PRO/FILE 2068

reviewed by Tim Woods
Colton, Oregon

PRO/FILE 2068 is a very special program, that the author Thomas B. Woods (no relation) has painstakingly put together for owners of the T/S 2068. Supplied with the software on cassette is a real gem of a users manual. It is 143 pages long and makes for some interesting reading.

What does PRO/FILE 2068 do? Tom goes into great detail in the manual describing what it is all about. Basically, it is a filing program or "data base". The possible applications are almost endless. These examples are given: filing mailing lists, business transactions, inventories, ham radio logs, and all kinds of records.

Right away, you will probably notice, that this data base is a little different than some others that were previously available. One that I think everyone has used at one time or other, is Timex's VU-FILE. The way VU-FILE works is by setting up "data fields" that the user specifies when setting up his file. Once the data fields are set, it is a real pain to go back and change or correct the files parameters, without totally redoing the whole thing. PRO/FILE doesn't use "data fields", but instead stores each individual file or record in individual screen displays. To change or delete is very easy with screen displays.

I gave PRO/FILE 2068 a little test drive. I entered 20 of my all time favorite songs as individual files each. Included in the file was the songs title, author, the year it came out, and a few lines from each one. I found that entering the data was easy, but I constantly had to refer to the manual to make sure everything was right. I am sure an avid PRO/FILE user would remember all of the commands...but as a beginner, I stumbled a bit. When all the data had been entered, I began to experiment with some of the multi-word search functions. When I asked for a particular song, it immediately flashed up on the screen.

PRO/FILE has a total capacity of 28,000 bytes! It is compatible with the Timex 2040 Printer or any number of Centronic interfaces and printers.

If you have a special application for PRO/FILE, I am sure information on it would be found in the users manual. It goes into great detail. There is even the program listing of the actual program, that can be altered to suit particular tastes.

PRO/FILE 2068 is an exceptional value at \$29.95. Its file searching and retrieving capabilities are very superior to other data bases that I have seen.

Available from several Timex vendors, and the author, Thomas B. Woods, PO Box 64, Jefferson, NH 03583.

COUPON MAGIC



2 PROGRAMS

reviewed by Tom Judd
Mulino, Oregon



BILL'S COUPON MAGIC is a program written by Bill Erickson of Decatur, GA for the T/S 2068. He sells his own program through HD SOFTWARE, for \$14.95 + \$1.50 for postage. His address is: 1445 Oldfield Road, Decatur, GA 30030.

This program is a lot more than it first appeared. Actually, there are three different functions. The first one is a shopping list that you can enter your items in categories and include the estimated cost of each item. When you are finished, it will give you the estimated amount of money you need to take with you to the store. There is an example provided for easy reference. The second feature is the coupon manager. It is very comprehensive and allows you to store up to 99 coupons with a description apiece. Then you can add coupons to the file or delete old expired ones with the search option. Finally, the third function is an all purpose list manager for anything that suits your fancy.

All of the lists can be sent to the 2040 Printer. You can also save all your data on tape. The program comes with very good documentation.

COUPON MAGIC is an attempt at a useful program. At first, I had visions of sitting down and clipping coupons and tediously entering each one into the computer. This seems like it would be a time consuming chore. I feel this program has a lot more potential being a list manager.

Mr. Erickson has programmed some very nice screen displays for this program, and I really liked the "women with shopping carts" design. All in all this is a nice software package.

THE DEALER'S DEN is a card game program written by Timothy Kessler for the T/S 2068. It is sold exclusively by WMJ DATA SYSTEMS, 4 Butterfly Drive, Hauppauge, New York 11788. It sells for \$19.95 ppd. and there is also a version available for the Commodore 64.

On side one of the cassette tape, is the main program THE DEALER'S DEN. You play four hands of Poker against the dealers one hand. You can throw away unwanted cards once for each hand. You can also select a bet. At the beginning of the program is a table that shows what combination of cards get what value.

I am not exaggerating when I say that THE DEALER'S DEN is genuine fun. Although, I must admit that I am a card game fanatic. When I started playing this one, they couldn't tear me away from the screen!

On side two is another game called DRAW POKER. It is just like the first game, only this time you play only one hand against the dealers hand. It is easier to play, but much harder to win. I preferred the first game.

The graphics for these programs are very good. About the best I have seen for card games on the Sinclair. There is even a little animated card-shuffling sequence while the program is loading. I would recommend that you do use a quality monitor, due to the high resolution of some of the cards and suits are hard to tell apart sometimes.

If you want to pass some time away playing a challenging game of Poker, do yourself a favour and pick up a copy of THE DEALER'S DEN.

THE DAMCO/ROTRONICS WAFADRIVE REVIEWED

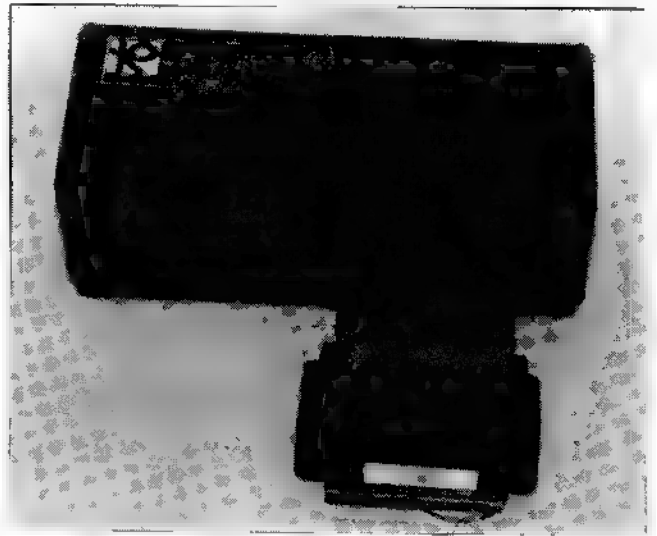
by Tim Woods
Colton, Oregon



If you have a very limited work area dedicated to your 2068 computer, or have a small home business, the following product may be of particular interest to you. It is the Rotronics Wafadrive mass-storage system from England. I purchased our unit from Damco Enterprises (67 Bradley Ct., Fall River, MA, 02720), who is the exclusive distributor of the Wafadrive here in the U.S. Damco has put together a special package that allows the Rotronics Wafadrive to operate on the T/S 2068, since the system was originally designed for the Sinclair ZX Spectrum. This package includes all of the "goodies" that come with the stock Wafadrive (which we will discuss shortly) plus a cartridge-style Spectrum emulator, and an adapter for the 2068's expansion port. The Spectrum and the Timex have different rear-edge ports.

When the Rotronics Wafadrive arrived in the mail, I was first struck by the size of the box it came in. Very small, to say the least. And the unit itself is quite compact. It reminds me of a Tupperware container with a lid (only black). The old saying, "good things come in little packages," seems to fit here. The Rotronics has not just one drive, but two. They are the "stringy floppy" type, which use special micro-cartridges (or wafers) designed by Entrepo. The Wafadrives are custom manufactured by BSR (the audio company) for Rotronics. Just for your information, A & J Microdrive uses the exact same wafers in their system for the 2068, but the similarity stops there.

Along with the dual drives, there is also a built in Centronics parallel printer interface and a R232 serial interface. The ports for these interfaces are at the rear of the unit along with a normal Spectrum expansion port, to which a Timex 2040 or ZX Printer can be attached. On the front of the Rotronics



are the two Wafadrive slots (drives A and B respectively), along with three LED's: one for power on, and the other two designating which drive is active. Protruding from the case, just below the drives, is a very short (about four inches) cable with the special adapter already connected to the end. This is what plugs into the rear of the 2068. Placement of the Rotronics Wafadrive is limited to directly behind the computer. For my installation, it posed a slight problem, but shortly corrected by moving the monitor off to one side.

Also in the same little box came two wafers. One is blank, and the other is a free word processor program from Softek, which is customized to work with the Rotronics. It is supplied with a 40 page manual, and is fairly comprehensive (ie. 64 col., auto word wrap/justification, page numbering, screen editor, block operations, ect.). This is a nice touch, to include a program that can be used right away with the system.

A 68 page manual is provided for the Wafadrive. The manual is spiral bound, and is clearly written and suprisingly detailed...giving some examples as it covers each concept.

You may be wondering what a system like this costs. Especially with all of the extras that are included. It is only \$229.95 from Damco, plus \$5.00 for postage. I also ordered the optional Centronics cable for \$12.95. If you are the owner of a Spectrum, there is a version of the Wafadrive for \$169.95. For those of you who already have an EMU-1 or OMNI emulator, there is a sytem available for \$199.95.

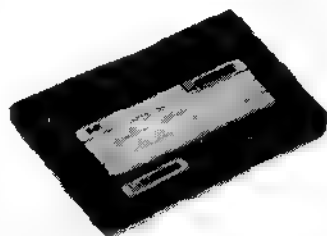
How does it all stack up? Very well indeed. The Wafadrives have their own operating system (WOS) in ROM, which is similar to disk operating systems used by other computers. Extended BASIC commands are used and typed in from keywords on the 2068 that were originally reserved for use with the Sinclair Micro-drives. These are CAT, FORMAT, OPEN, CLOSED, ect., along with standard commands like LOAD, SAVE, MERGE, and VERIFY. The symbols "#" and "*" are also used.

The following is an example of a command that is used to ready a blank wafer for transferring data:

```
FORMAT*"a:wafername"
```

"a" is used to denote which drive is being activated.

Loading time was fast. Transfer baud rate is rated at 18k. I timed the supplied word processor program, and it loaded in 30 seconds. A comparable cassette program would take three minutes or longer.



Wafers are available in three sizes (or storage capacities): 16k, 64k, 128k. They appear to be rugged for their tiny size, and have a plastic sliding dust cover. A wafer has a continuous loop of magnetic tape inside, and operates on a principle much like the old eight-track audio tapes. The shorter tapes will load files much faster than say the 128k length.

Using the Centronics interface was a snap. I hooked it up to my TEAL model 270 electronic typewriter/daisy wheel printer via the optional cable. The interface will send standard ASCII codes to the printer using LPRINT, LLIST, some BASIC lines using "stream" channels, or block commands in the supplied word processor software. Since this is a "no-frill" type interface, it doesn't include smart software (like the Aerco interface), that allows you to execute graphics screen dumps, ect. with dot matrix printers. These functions would have to be developed by further programming and software.

I didn't give the RS232 interface a try, since I don't have a compatible peripheral. It should be pointed out that it is a bidirectional type, and baud rate is selectable.

Most prospective buyers would probably be concerned about cassette software compatibility. First of all, take into consideration that this is a Spectrum system. Secondly, commercial programs are usually protected against making back-up copies of any kind (cassette or wafer). You do have the following options:

1. Make wafer copies of Spectrum programs that have the option for making back-ups.
2. Use a "header-reader" type program to help you BREAK and SAVE commercial cassette software for the Spectrum.
3. Any Spectrum program that you can BREAK and SAVE, may be transferred to wafer.
4. Some software for the Timex can be saved on wafer. This includes a few machine code programs, and most all of the BASIC programs. For example, I made a wafer copy of programs from the "Great Game And Graphics Show" by JRC Software.

You may also make copies from wafer to wafer, simply by using the MOVE command. Commercial software is being developed and sold on Rotronics type wafers now. Damco has a list and prices of several titles that they carry in stock.

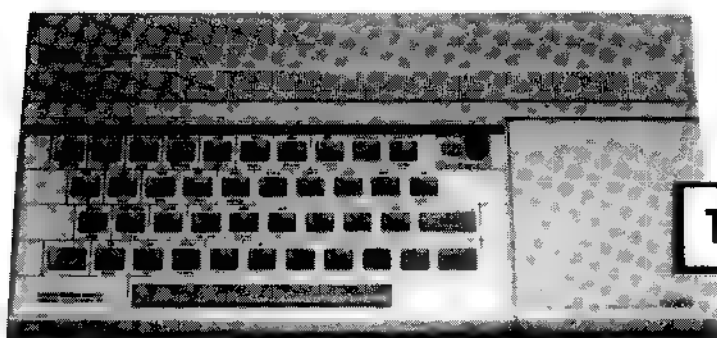
Much could be said about the Rotronics Wafadrive. More info than we obviously have space in the magazine for. So, I will close, leaving you with a few thoughts to consider. First, the Rotronics is a little faster and lower in price than the A & J model 2000 (if you

were to add an additional drive, printer interface, ect.). The Rotronics is about half the price of a good disk system with only a single drive, but not nearly as fast as floppy disks. It is about the same price as a complete Sinclair Microdrive system, but the Rotronics comes with more features like the built in Centronics interface and free word processor. Also take into consideration that you also receive Spectrum emulation and a Spectrum expansion port...this

will open a whole new world of information for the T/S 2068.

Over all, the features that I liked best were the units small (all-in-one) size, and the ease in which the Rotronics filed and retrieved data. The price should also be within reach of most Timex users budgets.

Good work Rotronics and Damco.



TS 2068 / SPECTRUM-WARES

Good news for T/S users who have installed the ROMSWITCH or a Spectrum ROM in their computers. They can now use the Sinclair ZX Microdrives...without the added cost of purchasing an emulator. The method is a brand new Microdrive Adapter available from English Micro Connection (15 Kilburn Ct., Newport, RI 02840), for only \$35 ppd. The Adapter is a standard "twister" type Spectrum expansion port board, with the addition of a special circuit that includes a 74LS10 IC, a diode, and a resistor. The circuit was designed by John Oliger, and was incorporated on the board by Doug Dewey, who is the manufacturer of the Microdrive Adapter. Now the ROMSWITCH, Spectrum ROM's and OMNI emulators can operate the Interface One, Microdrives, and other English peripherals on their 2068, without a hitch! The English Micro Connection also carries a selection of Sinclair merchandise including the Microdrives and the Spectrum Plus computer. Write for details.

The Software Supermarket in London, England has just recently changed their name to SPEEDYSOFT. They do a large overseas mail order business, and accept American credit card numbers. Their newest software catalog features 24 Spectrum programs newly released. For details, write to: Speedysoft, 87 Howard's Lane, London SW15 6NU England.

Time Designs Magazine will be reviewing some more Spectrum programs in our next issue. Since there is such a wide variety of titles available from England, reading a report from a trusted reviewer before purchasing, makes good sense. After all, money doesn't grow on trees. As of this writing the American dollar compared to the British pound was \$1.22 (a slight increase).

TS 2068 DISC SYSTEM

FD-68 INTERFACE

Controls 1-4 drives

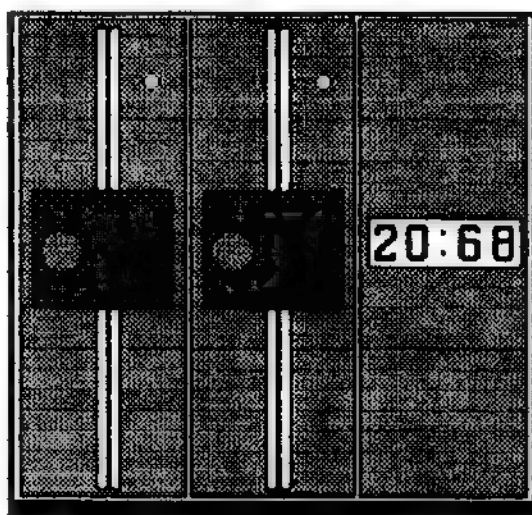
3-8 inch Shugart Comp.

Single or double sided

40/80 tracks per side

64K RAM & 8K ROM
on board

RGB monitor output



SYSTEM COMPONENTS

\$199 FD-68 Interface

\$99 Drive 40T/DS/DD
5 inch/400 kilobyte

\$99 Dual Drive Cabinet
and 5 amp Pwr Pack

\$3 Per Item S&H

Texas Residents add 5%

VISA/MasterCard add 5%

THE TIME HAS COME

Enhance the performance of your TS 2068 with the AERCO Disc System. All of the speed and convenience of a full-out floppy disc system. Load programs at an incredibly fast 250,000 bits/sec. Fully compatible with all Shugart type drives, including those already in use with the AERCO 1000 Disc System. The 64K of on-board RAM can be used as a second bank of system memory or a soon to be released full-blown CP/M System (version 2.2). The power supply is a 5-amp high efficiency switcher. We offer a variety of other hardware for all models of SINCLAIR-TIMEX.

	<u>TS/2068</u>	<u>TS/1000</u>
Floppy Disc Interface	\$199	\$179
Disc Drives	from 99	from 99
Power Supplies ..	99	99
Centronics Printer I/O ..	69	99
Dual RS-232C Serial I/O ..	99	99
Direct Video Mod (DV-1) ..	n/a	15
C ITOH 8510 Printer ..	375	375
ROM Bd. with Auto Disc Boot ..	n/a	59
RGB Cable (specify monitor) ..	30	n/a
CP/M (V 2.2) ..	coming soon	n/a

AERCO
ACME ELECTRIC ROBOT CO

Box 18093 Austin TX 78760
Ph (512) 451-5874



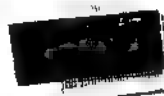
City, State Zip

Zig

The Z-LINK

INTERFACE CARD

designed by CLIFFORD & ASSOCIATES



Z-LINK simply plugs in the back of your T/S 2068. When used with a Spectrum emulator (EMU-1 or OMNI) it allows you to run the Sinclair Microdrives, light pens, voice boxes....any ZX Spectrum peripheral! See review in March/April '85 issue of Time Designs Magazine.

Z-LINK fully assembled and tested \$47 ppd.
Z-LINK kit with all parts \$37 ppd.
Z-LINK bare board w/documentation \$17 ppd.

SINCLAIR ACCESSORIES LTD.
29703 S. Salo Rd. Mulino, OR 97042

COUPON MAGIC

© 1984 Bill Erickson
T/S 2068

A coupon file that holds 100 coupon descriptions with up to 99 coupons in each. A shopping list section that is worth the price all by its self. And a storage list that holds 100 items and their locations.

While the other two files are great, the shopping list is the one that gets most of the work done. Like the other two, it has on screen edit, but it also will check up on the other files. It will tell you approx. how much money to take when you go to the store, then print out a shopping list on your 2040 that can hold up to 100 items with notation to tell you if you have a coupon for an item. It also makes a notation if you have the item stored someplace, + it gives you a place by each item to check off as you put it in the cart.

User info on-screen at all times for easy operation and a great graphic display for eye appeal.

SEND check or money order for \$14.95 + \$1.50 P & H
To: William Erickson
1445 Oldfield Rd.
Decatur, GA 30030

USEFUL FUN EASY TO USE



The Sinclair/Timex User's Magazine

Hardware Projects • Hardware Reviews
Software Reviews • Product Comparisons
Published Monthly • Back Issues Available
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SUM Magazine is aimed at Sinclair and Timex users who want to learn what is available for their computers, how to do things no one else is doing, and what is just over the horizon. Examples of recent articles include: Building your own Spectrum Emulator; an extensive series of reviews on word processors for the 2068; adding an RGB monitor to your 2068, and a series on repairing your TS1000 and ZX81 computers.

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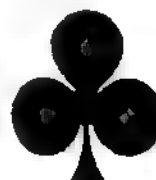


THE DEALER'S DEN

This software package contains two programs:

1. THE DEALER'S DEN—play four hands of Draw Poker against the dealer's one hand.
2. DRAW POKER—just like the arcade game at your local nightclub.

Commodore 64
(cass.) \$24.95ppd.
Commodore 64
(disk) \$29.95ppd.
Timex/Sinclair 2068
\$19.95ppd.



If you like Poker
you will love THE
DEALER'S DEN!

Send for our catalog of over 50 programs for the Commodore 64 and the Timex/Sinclair line of computers.

WMJ DATA SYSTEMS
4 Butterfly Drive
Hauppauge, NY 11788

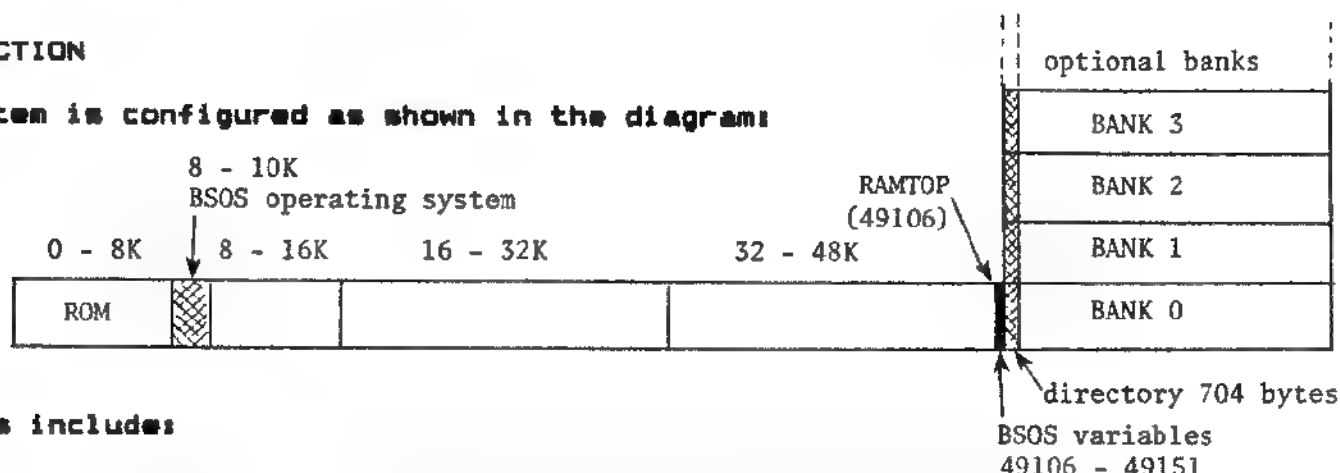


BANK SWITCHING OPERATING SYSTEM FOR THE ZX81/T81000

- *** USE THE 48 TO 64K BLOCK OF MEMORY FOR BASIC PROGRAMS ***
- *** CREATE A "VIRTUAL MEMORY" SYSTEM ***
- *** AS DESCRIBED IN T 8 HORIZONS (March 1984 through March 1985) ***
- *** USE WITH A 64K RAM PACK ***
- *** OR BUILD A BANK-SWITCHED SYSTEM WITH LIMITLESS MEMORY ***

INTRODUCTION

The system is configured as shown in the diagram:



Commands includes:

SAVE	Save a file from the BASIC system to the bank
LOAD	Load a file back from the bank into the BASIC system
PURGE	Purge a file from the bank
RECLAIM	Clear variables or a program (or part) from the BASIC system
PACK	Repack the contents of the bank
BANK	Change from one bank to another
ROOM	Determine space available in a bank
QUIT	Return to Sinclair BASIC system

A sample directory listing the contents of a bank is shown on the right. Some of the routines in BSOS can be called from within a BASIC program to create a virtual memory system -- so you can have a program larger than 16K or a huge data file. A virtual memory system allows the program to change while it is running.

The program on the tape will transfer the operating system to the 8-10K block; reset RAMTOP to 49106; and load a directory (and any routines already in the bank). The tape is available for \$10 ppd from:

HUNTER
1630 FOREST HILLS DRIVE
OKEMOS, MICHIGAN 48864

BANK 1 DIRECTORY

NO.	NAME	.EXT	ADDR	SIZE
A:	DIRECTORY	.DIR	49152:00704:	
B:	SAVEROUTINE	.PRG	49856:00134:	
C:	DEC-TO-HEX	.PRG	49990:00308:	
D:	HEX-TO-DEC	.PRG	50298:00134:	
E:	CONVERSION	.PRG	50432:00750:	
F:				
G:				
H:				
I:				
J:				
K:				
L:				
M:				
N:				
O:				
=====				
1:	SAVE	3:	PURGE	5:
2:	LOAD	4:	RECLAIM	6:
		7:	PACK	8:
			ROOM	
			BANK	
			QUIT	

TAKE A LOOK AT THIS VALUE

This is the only ad you will
receive for these programs
order now!

JRC SOFTWARE

P.O. BOX 448
SCOTTSDALE, IN
47176

Even if you do not plan to
order products, we would like
to hear from you. In addition, JRC would
appreciate information on other
users, groups, and computer
stores in your area.

New! BOTH OF THESE 2 PROGRAMS BELOW ON ONE TAPE FOR \$24.95!

2068 INTEGER BASIC COMPILER

The COMPILER takes easy to use BASIC
and converts it to 105 times faster
machine code! Now your programs can
have the professional speed unavail-
able in ordinary BASIC. The compiler
uses simple integer expression evalua-
tion, multiple statements per line, plus
PRINT, GOTO, INVERSE, CODE, SOUND,
RUN, STOP, PAUSE, INVERSE, BRIGHT,
FLASH, USR, TAB, AT, OR, AND, <, >, REM,
BORDER, INK, PAPER, LET, GOTO, GOSUB,
IF, THEN, RETURN, POKE, OUT, RAND, ON, NZ,
* /, %, PEAK, IT, and RND.
Make a quantum leap in your processing
power with JRC BASIC COMPILER.

```
*****
***** JRC TIPS *****
*****
TAPE UNLOCKER for the 2068
HERNIE -- This easily stops
automatic run. If you find
yourself in an input that you
can't get out of then type.
USR 15885
```

!!! INCREDIBLE !!!
!!! SUPER TAPE !!!
TS15885/1000 owners...
Look what you get...
Secret ROM routine
Super 24 action games
Four type BASIC
Touch type BASIC
Desktop photo sound effect
Printer upper/lower case
Multiple programs in 26/64k
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... INCREDIBLE GRAPHICS!
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All on quality TDK tape for
\$24.95! ... About the normal
price for a tape is \$10.00
or less. ...
There is so much on this tape
that I honestly think you will
be surprised. And since all of
these products have an unconditional
ten day money-back guarantee,
you risk absolutely nothing.

JRC SOFTWARE
(JOHN RICHMOND CORREY)
P.O. BOX 448
SCOTTSDALE, IN 47176
1812-752-6671 & -51861
SUPER TAPE now comes with 45 pro-
grams.

2068 TWO PASS 280 ASSEMBLER

The 280 ASSEMBLER uses a full two
pass, so the convenience you nor-
mally associate with a good assembler
are all here. There is full use of
LABELS so you never have to worry
about jump addresses or where a
piece of data might be. The assem-
bler can also handle simple expression
evaluation which takes work off the
programmer. Although there are many
assemblers available for the 2068,
very few are as easy to use as the
JRC 280 ASSEMBLER. Entering and edit-
ing you memories are easy since there
are multiple statements per line and
comments can be put anywhere.

Have you noticed that while in
memory editor, you can't type
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2. *** TOUCH TYPE LEARNING GAME ***

Even if you're not a typist now, you
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This program will introduce you to 197
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on each. Weak keys are reviewed more
often than others. With practice you
will be able to touch type BASIC pro-
grams, which is much easier and handier
than the "hunt and peck" method.

Although this may be one of the most
practical and educational programs you
can buy for the 2068, keep in mind that
it is a GAME and a fun one too. There
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3. *** HI-RES LANDER ***

Why settle for games that use block
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the classic lunar lander features a ship
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kind of realism, you have to have a soft
touch to land. Plus patience. And it
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for novice astronauts, there are two
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capability of your TIMEX computer!

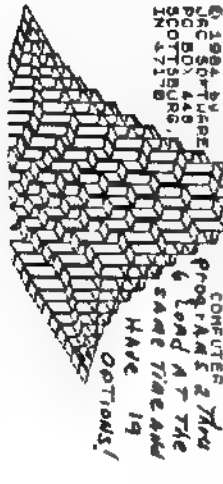
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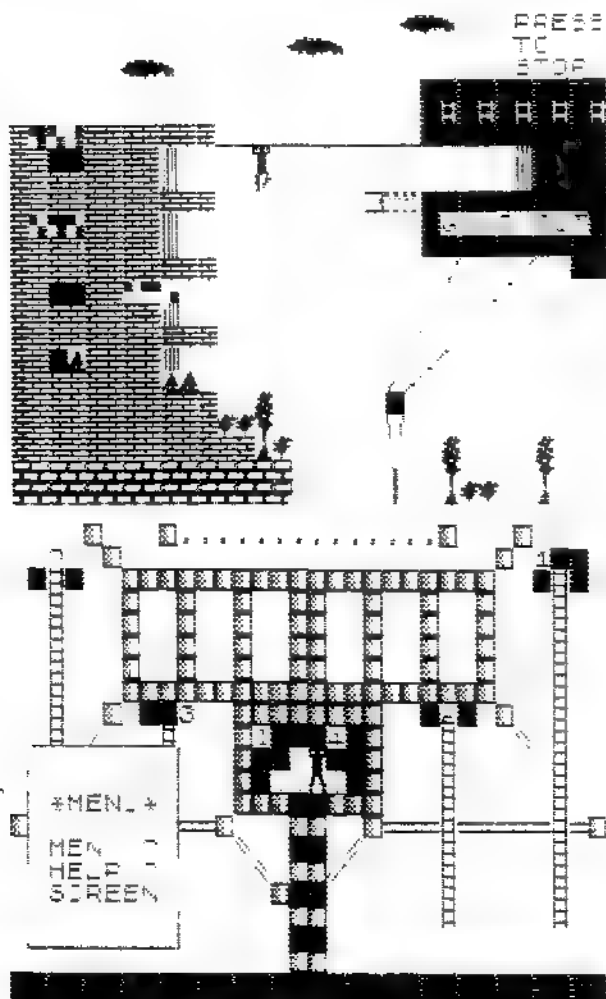
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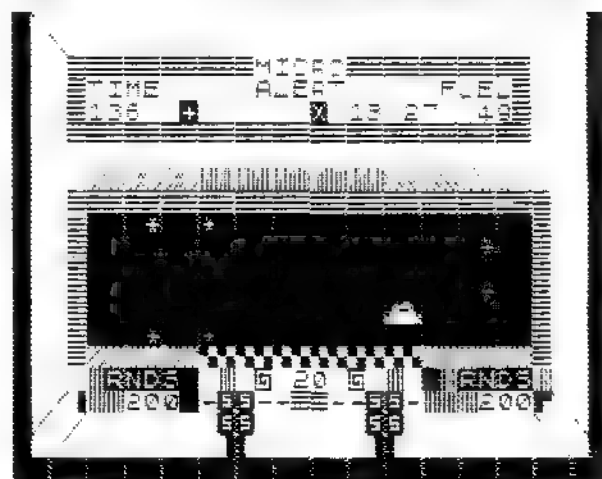
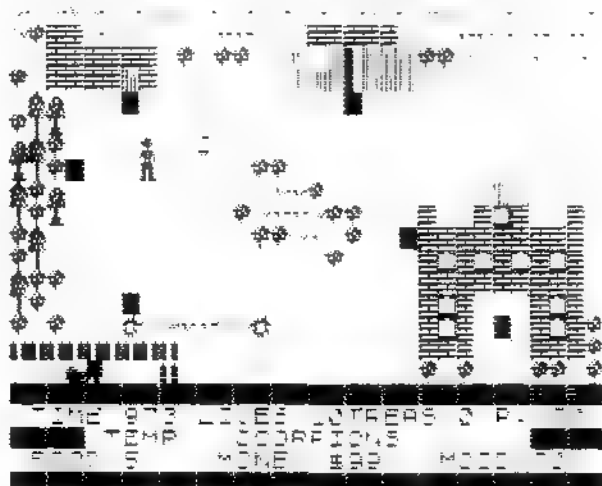
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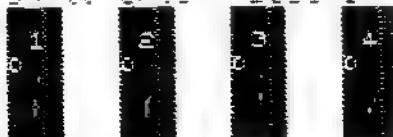
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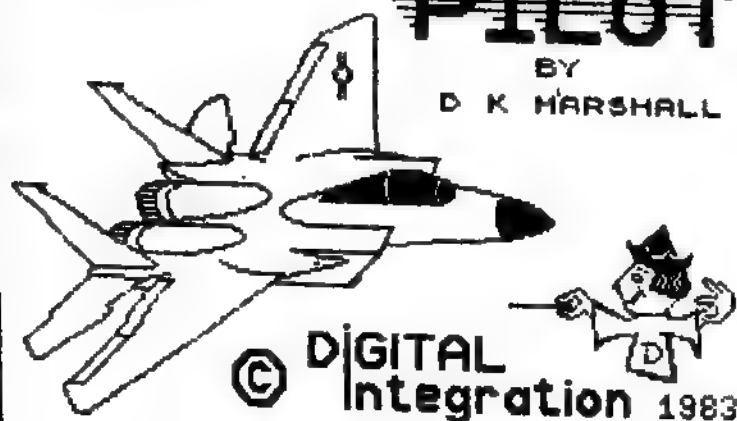
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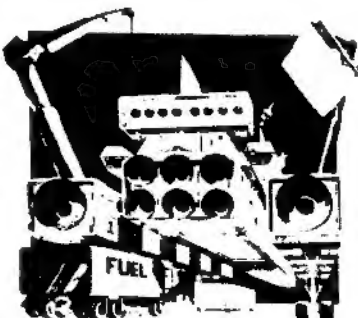
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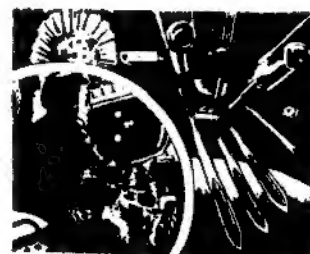
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